

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-52 (Canceled).

Claim 53 (New): A reaction vessel for dissolving heavy metals from solid materials contaminated with heavy metals comprising;

an anode electrode;

a cathode electrode;

a diaphragm for defining an anode zone including the anode electrode and a cathode zone including the cathode electrode; and

a device configured to supply the solid materials contaminated with heavy metals into the cathode zone,

wherein into the cathode zone, the solid materials, water and an acidic substance or an alkaline substance are introduced.

Claim 54 (New): The reaction vessel of claim 53, wherein the reaction vessel is a slurry formation vessel for forming a mixture in slurry comprising the solid materials contaminated with heavy metals, water and the acidic substance or alkaline substance.

Claim 55 (New): The reaction vessel of claim 53, further comprising:

a slurry withdrawal port for withdrawing the slurry including at least the solid material;

a slurry transferring line connected with the slurry withdrawal port; and a pump for slurry provided on the slurry transferring line.

Claim 56 (New): The reaction vessel of claim 53, further comprising:
a slurry withdrawal port for withdrawing the slurry including at least the solid material contaminated with heavy metals;
a slurry transferring line connected with the slurry withdrawal port;
a solid-liquid separating apparatus connected with the slurry transferring line; and a pump for slurry provided on the slurry transferring line.

Claim 57 (New): The reaction vessel of claim 53, further comprising:
a stirrer for stirring slurry comprising at least the solid materials contaminated with heavy metals.

Claim 58 (New): The reaction vessel of claim 53, wherein the diaphragm is in a cylindrical, box, or bag-shaped form composed of the diaphragm alone or a combination of the diaphragm and other reinforcement, and the anode electrode is positioned therewithin.

Claim 59 (New): The reaction vessel of claim 53, further comprising plural cathode electrodes which form a star or radial pattern to surround the diaphragm.

Claim 60 (New): The reaction vessel of claim 53, wherein plural cathode electrodes are positioned in the reaction vessel.

Claim 61 (New): The reaction vessel of claim 53, further comprising:
a shearing force suppressing device configured to decrease a shearing force exerted on a surface of the cathode electrode by slurry containing at least the solid material contaminated with heavy metals; and

a device configured to provide upward-flow of slurry at a predetermined flow rate.

Claim 62 (New): The reaction vessel of claim 53, further comprising:

a shearing force suppressing device to decrease a shearing force exerted on a surface of the cathode electrode by slurry containing at least the solid material contaminated with heavy metals; and

a device configured to provide upward-flow of slurry at a predetermined flow rate from the bottom to the upper portion of the reaction vessel comprising:

a slurry withdrawal port provided on the upper portion of the reaction vessel;

a slurry introduction port provided on the bottom portion of the reaction vessel; and

a circulating pump for circulating the slurry from the slurry withdrawal port to the slurry introduction port.

Claim 63 (New): The reaction vessel of claim 53, further comprising:

a shearing force suppressing device to decrease a shearing force exerted on a surface of the cathode electrode by slurry containing at least the solid material contaminated with heavy metals; and

a flow controlling mechanism comprising:

a flow controlling mechanism comprising one or more materials selected from a partitioning wall, a plate material, a porous material, a grid material and a network-shaped material.

Claim 64 (New): The reaction vessel of claim 53, further comprising in the cathode zone:

at least one dissolution cathode electrode having a smooth surface for mainly acting to dissolve the heavy metal ions; and

at least one deposition cathode electrode having a rough surface for mainly acting to deposit the heavy metal ions.

Claim 65 (New): The reaction vessel of claim 53, further comprising:

a plurality of cathode electrodes in the cathode zone, wherein

a cathode electrode located at a position relatively apart from the anode electrode acts as a dissolution cathode electrode for mainly acting to dissolve the heavy metal ions; and

a cathode electrode located at a position relatively near to the anode electrode acts as a deposition cathode electrode for mainly acting to deposit the heavy metal ions.

Claim 66 (New): The reaction vessel of claim 53, further comprising:

a plurality of cathode electrodes in the cathode zone, wherein

at least one cathode electrode is controlled to have higher reduction potential than the other cathode electrodes to allow the at least one cathode electrode be a dissolution cathode electrode for mainly acting to dissolve the heavy metal ions.

Claim 67 (New): The reaction vessel of claim 53, further comprising:

a deposition cathode electrode of relatively high standard electrode potential for mainly acting to deposit the heavy metal ions; and

a dissolution cathode electrode of relatively low standard electrode potential for mainly acting to dissolve the heavy metal ions.

Claim 68 (New): The reaction vessel of claim 53, further comprising:

a deposition cathode electrode made of a substance being relatively easy to electrodeposit heavy metals for mainly acting to deposit the heavy metal ions; and

a dissolution cathode electrode made of a substance being relatively hard to electrodeposit heavy metals for mainly acting to dissolve the heavy metal ions.